REMARKS

This amendment is responsive to the Office Action mailed August 22, 2007. Reconsideration and allowance of claims 1-20 are requested.

The Status of the Claims

Claims 1, 2, and 10-13 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Scheruebl et al., U.S. Pat. No. 6,674,572 (hereinafter "Scheruebl") in view of Worster et al., U.S. Pat. No. 5,963,314 (hereinafter "Worster").

Claims 3 and 14 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Scheruebl in view of Worster in further view of Black et al., U.S. Pat. No. 6,766,187 (hereinafter "Black").

Claims 4 and 6-9 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Scheruebl in view of Worster in further view of Kobayashi, U.S. Pat. No. 6,094,223 (hereinafter "Kobayashi").

The Scheruebl reference

Scheruebl is the primary reference applied against all claims. The Office Action alleges that **Scheruebl** col. 3 line 36 through col. 4 line 56 discloses height adjustment based on spatial frequencies. This cited section actually discloses a first concept relating to generating a "height histogram" and a second concept of using the height histogram for autofocusing.

The first concept is disclosed at Scheruebl col. 3 line 36-col. 4 line 14, and actually goes back to col. 2 line 65. The approach of Scheruebl uses a white or other spectrally complex light source (col. 2 line 65 through col. 3 line 2), and the optical pathway includes a deliberate longitudinal chromatic aberration introduced by chromate (6) (col. 3 lines 11-12) such that the focal points of different color components lie in different planes after passing through the color-corrected objective (7). The result is that the confocal image is color-coded such that the spectral wavelengths (λ) correlate with height to provide color-coded height profiles, as shown in Fig. 2 (col. 3 lines 16-28). Elsewhere (col. 4 line 67) the color-coded height profile is termed a height histogram. The illustrative example color-coded height spectra or

histrograms of Fig. 2 are described at col. 3 line 43-col. 4 line 14. For example, looking at the second-from-top example in Fig. 2, the defect (F) is higher than other surface features and accordingly produces a signal at high (λ) corresponding to high height. In the next example down, the defect is at intermediate height and accordingly produces a signal at intermediate wavelengths in the corresponding color-coded height spectrum or histogram.

The passage at col. 4 lines 15-21 transitions from the aforementioned color-coded height spectrum concept to an autofocusing technique. Any height deviation (Δz) caused by (mis)focusing in the z-direction will result in a corresponding shift ($\Delta\lambda$) of the corresponding color-coded height spectrum.

Accordingly, with reference to Fig. 3, any error in depth focus is immediately detectable as a wavelength shift ($\Delta\lambda$), which makes the autofocusing trivial for the system of Scheruebl. See col. 4 lines 22-24. "Focus" in the context of Scheruebl amounts to alignment of a reference wavelength (λ_o) with a determined height level of the object (col. 4 lines 25-30) so that the color-coded height spectrum can be related with height levels. The Schereubl system is not a conventional confocal microscope, but rather uses the white (or other complex spectrum) light source in conjunction with the chromate (6) to intentionally introduce chromatic aberration so as to generate the color-coded height profiles or histograms. Hence, for the Scheruebl system autofocusing is trivial, as shown in Fig. 3 – measure $\Delta\lambda$ from the color-coded height histogram, and convert to the focusing error Δz.

The passage in Scheruebl at col. 4 lines 44-65 describe problems associated with focusing of conventional confocal microscopes, namely that only the object plane is focused, which may or may not be the plane of interest. Significantly, no solution for autofocusing in the case of a conventional confocal microscope is presented in Scheruebl. In particular, it is respectfully submitted that the Office Action is not correct in alleging at page 3 that Scheruebl teaches means to determine the image characteristic from a detected image until the determined amplitudes of spatial frequencies are maximal. The height histograms of Scheruebl are not spatial frequencies. The abscissa is spectral frequency (i.e., wavelengths of light) and the ordinate is intensity at each spectral frequency, which correlates with height rather than with spatial frequency.

The Claims Distinguish Patentably Over the References of Record

Claim 1 calls for focusing means for focusing the excitation system, the monitoring system and the detection system on a detection plane in the target region, and image processing means for processing an image of the detection plane acquired by the monitoring system to determine image characteristics of the image of the detection plane including at least one of a spatial dimension characteristic, a spatial frequency characteristic, and an image contrast characteristic, which indicate if the imaging system is focused on the object to be analyzed.

Scheruebl does not acquire an image of a detection plane, but rather acquires a color-coded height profile or histogram spanning a range of heights. This acquisition is enabled by Scheruebl's use of a white (or other complex spectrum) light source and the chromate introducing chromatic aberration so as to spread out signals from different heights along the wavelength spectrum. Scheruebl's autofocusing does not entail image processing, but rather analysis of the color-coded height histogram entailing comparison with a reference histogram as shown in Fig. 3 to determine $\Delta\lambda$ and conversion of $\Delta\lambda$ to the corresponding focusing error Δz.

Still further, claim 1 as amended calls for processing to determine image characteristics of the image of the detection plane including at least one of a spatial dimension characteristic, a spatial frequency characteristic, and an image contrast characteristic. The analysis of Scheruebl's color-coded height profile or histogram determines the parameter $\Delta\lambda$, which is not a characteristic of an image of a detection plane, much less one of the characteristics specified in claim 1.

The remaining references are not cited as relating to focusing determination, and accordingly cannot remedy these deficiencies of Schreubl.

Claim 11 calls for image processing an image of the detection plane acquired by the imaging system to determine image characteristics of the acquired image of the detection plane, which indicate if the imaging system is focused on the object to be analyzed. Scheruebl does not acquire an image of a detection plane, but rather acquires a height histogram spanning a substantial depth of interest. Scheruebl determines a spectral parameter $\Delta\lambda$ and a corresponding depth error Δz, neither of

which are image characteristics of an image of a detection plane. The remaining references are not cited as relating to focusing determination, and accordingly cannot remedy these deficiencies of Schreubl.

Claim 12 calls for image processing means for determining image characteristics for an image of the detection plane acquired by the imaging system, which indicate if the imaging system is focused on the object to be analyzed. Again, Scheruebl does not entail acquiring an image of a detection plane, much less determining an image characteristic for such an image which indicates if the imaging system is focused on the object to be analyzed. The remaining references are not cited as relating to focusing determination, and accordingly cannot remedy these deficiencies of Schreubl.

New claims 15-20 are added to call out further patentable distinctions.

New claim 15 is supported at least at page 6 lines 25-32. More generally, the illustrative embodiment described in the detailed description relates to Raman spectroscopy and employs a Raman spectroscopy device (ods). Schereubl is not related to Raman spectroscopy.

New claim 16 is supported at least by the excitation system (exs) of the illustrative Raman spectroscopy device (ods) which is a different light source from the monitoring source beam (las) of the monitoring system (lso).

Claims 17 and 19 call for the image characteristics to include a spatial dimension or frequency characteristic. The characteristic determined by Scheruebl, i.e. $\Delta\lambda$ or Δz, is not an image spatial dimension or spatial frequency characteristic.

Claims 18 and 20 call for the image characteristics to include an image contrast characteristic. The characteristic determined by Scheruebl, i.e. $\Delta\lambda$ or Δz, is not an image contrast characteristic.

For at least the foregoing reasons, it is respectfully submitted that claims 1-20 as set forth herein distinguish patentably over the references. Accordingly, Applicants respectfully request allowance of claims 1-20.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-20 distinguish patentably over the references of record and meet all statutory requirements. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, she is requested to telephone Thomas Kocovsky at (216) 861-5582.

Respectfully submitted,

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